

WHAT IS CLAIMED IS:

1. An autoregulated fusion protein comprising an output domain and a plurality of input domains, wherein at least one of the input domains is heterologous to the output domain, and the input domains interact with each other to allosterically and external, ligand-dependently regulate the output domain.

2. The fusion protein of claim 1, wherein the output domain is catalytic.

3. The fusion protein of claim 1, wherein the output domain regulates transcription.

4. The fusion protein of claim 1, wherein the output domain is constitutively active and in the absence of the ligand, the input domains interact to inhibit the output domain.

5. The fusion protein of claim 1, wherein the plurality comprises two input domains, both heterologous to the output domain, and which form a specific binding pair, and the ligand disrupts pair-specific binding of the input domains.

6. The fusion protein of claim 1, wherein the plurality comprises four input domains, all heterologous to the output domain, and which form first and second specific binding pairs which allosterically regulate the output domain dependent on first and second, different external ligands, respectively.

7. The fusion protein of claim 6, wherein the input domains cooperatively regulate the output domain as an OR-gate.

8. The fusion protein of claim 6, wherein the input domains cooperatively regulate the output domain as an AND-gate.

9. The fusion protein of claim 6, wherein the input domains cooperatively regulate the output domain as an AND-NOT-gate.

10. A method for modulating the output of the fusion protein of claim 1, the method comprising the step of contacting the fusion protein with the ligand, whereby the output of

the fusion protein is modulated.

11. The method of claim 9, further comprising the step of detecting the modulation of the output of the fusion protein.

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12. A cell comprising a fusion protein according to claim 1.

13. A method for modulating the output of the fusion protein of the cell of claim 11, the method comprising the step of contacting the fusion protein of the cell with the ligand, whereby the output of the fusion protein is modulated.

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